

# ARCHIVED REPORT

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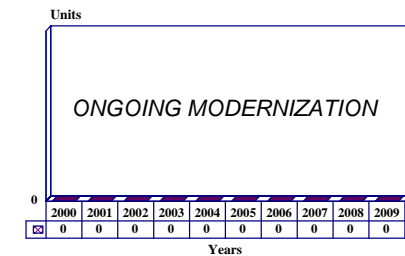
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## Harushio Class - Archived 8/2001

### Outlook

- Last unit slightly different from, larger than the first six
- Will be succeeded by larger Oyashio class
- No AIP to be implemented, even as retrofit installation
- Modernization of onboard systems will continue for years to come

10 Year Unit Production Forecast  
2000-2009



### Orientation

**Description.** Diesel-electric torpedo attack submarine

Japan

#### Sponsor

Japan Maritime Self-Defense Force  
Japan Defense Agency  
7-45 Akasaka 9-chome  
Minato-ku  
Tokyo 107, Japan

Kawasaki

Kobe

Japan

**Licensee.** No production licenses have been granted.

**Status.** In service, with upgrades and modernization continuing.

#### Contractors

Mitsubishi  
Kobe

**Total Produced.** Seven

#### Pennant List

<u>Number &amp; Name</u>	<u>Builder</u>	<u>Launch</u>	<u>Commissioning</u>	<u>Homeport</u>	<u>Fleet</u>
SS-583 <i>Harushio</i>	Mitsubishi, Kobe	7/26/1989	11/30/1990	Kure	5th SubDiv
SS-584 <i>Natsushio</i>	Kawasaki, Kobe	3/20/1990	3/20/1991	Kure	5th SubDiv
SS-585 <i>Hayashio</i>	Mitsubishi, Kobe	1/17/1991	3/25/1992	Kure	3rd SubDiv
SS-586 <i>Arashio</i>	Kawasaki, Kobe	3/17/1992	3/17/1993	Kure	3rd SubDiv
SS-587 <i>Wakashio</i>	Mitsubishi, Kobe	1/22/1993	3/1/1994	Yokosuka	6th SubDiv
SS-588 <i>Fuyushio</i>	Kawasaki, Kobe	2/16/1994	3/7/1995	Kure	3rd SubDiv
SS-589 <i>Asashio</i>	Mitsubishi, Kobe	7/12/1995	3/12/1997	Yokosuka	6th SubDiv

**Mission.** These submarines are designed for anti-submarine warfare, anti-surface warfare, ocean patrol, and surveillance duties.

**Price Range.** The original cost of a Harushio class submarine was reported to be around US\$450 million.

## Technical Data

### Specifications

	<u>Metric</u>	<u>US</u>
<b>Dimensions</b>		
<i>Length:</i>	80 m	262.5 ft
<i>Beam:</i>	10.0 m	32.8 ft
<i>Draft:</i>	7.7 m	25.2 ft
<b>Displacement</b>		
<i>Surfaced:</i>	2,440 tonnes	2,400 tons
<i>Submerged:</i>	2,795 tonnes	2,750 tons
<b>Performance</b>		
<i>Speed, Surfaced:</i>	22 km/h	12 kts
<i>Speed, Submerged:</i>	37 km/h	20 kts
<i>Diving Depth:</i>	455 m	1,500 ft
<i>Crew:</i>	10 officers, 65 enlisted	

	<u>Type</u>	<u>Quantity</u>
<b>Electronics</b>		
<i>Sonars – Bow-Mounted:</i>	Hughes/Oki ZQQ-5B	1
<i>TASS:</i>	ZQR-1	1
<i>Radars:</i>	JRC ZPS-6 (I-band)	1
<i>ESM:</i>	NZLA-7	1
<i>Periscope:</i>	Kollmorgen	
<i>Fire Control System:</i>	ZYQ-2	
<b>Weaponry</b>		
<i>Torpedo Tubes:</i>	21 in HU-603B	6
<i>Torpedoes:</i>	Type 89/Type 80	20 total (with SSM)
<i>Missiles – SSM:</i>	Sub-Harpoon	
<b>Propulsion</b>		
<i>Main Engines:</i>	MAN V8/V24-30 MATL	2x1,700 shp
<i>Generator Sets:</i>		2x2,840 kW
<i>Electric Motor:</i>	Fuji or Toshiba	1x7,220 shp
<i>Batteries:</i>	Yuasa	2x480 cell
<i>Propeller:</i>	Fixed pitch	1

**Design Features.** The Harushio class submarine uses a standard Albacore-type hull with sail-mounted diving planes. This is basically a modified version of the design used for the preceding Yuushio class. The submarine has a maximum diving depth of 450 meters and a never-exceed depth of 500 meters. Crush depth is believed to be 600 meters. The submarine is covered with anechoic tiles to reduce vulnerability to active sonar systems. The propulsion system is fully rafted and consists of two MAN V8-V24-30 diesel engines, each capable of developing 1,700 hp. The diesels are manufactured by either Kawasaki or Mitsubishi. The motor is capable of 7,200 hp to a single shaft.

The sonar system installed on the class is the ZQQ-5B fully integrated sonar suite. This combines the output from the low-frequency active-passive bow sonar with the flank arrays, intercept sonar and S-TASS towed array. The ZPS-6 radar is used for surface navigation and can give targeting information. The electronic support measures (ESM) system installed is the NZLR-1, which is believed to provide a level of angular resolution sufficient for over-the-horizon targeting of

the Sub-Harpoon missiles. Shipboard sensors and weapons are integrated using the ZYQ-2 fire control system. The periscope is made by Kollmorgen, the company responsible for providing most of the US submarine periscopes.

**Operational Characteristics.** The main armament consists of six 21-inch torpedo tubes located amidships.

All submarines use the Japanese Type 89 homing torpedoes. The class is equipped to fire the Sub-Harpoon missile, which has a 70-nautical-mile range against surface targets. The endurance and range of the class have not been disclosed, but based on the capabilities of other submarines that size, a 45-day patrol capability and a range of 10,000 nautical miles is probable.



Harushio Class Submarine

Source: Forecast International

## Variants/Upgrades

Mitsubishi-built units are equipped with MAN diesels; those built by Kawasaki are equipped with Kawasaki 12V-25S diesels.

**Improved Harushio Class.** See the following item.

**SSK 589.** The last of the series, the HIJMS *Asashio*, while officially considered part of the Harushio class, actually represents an interim standard between the baseline Harushios and the succeeding Oyashio class submarines, and is also known as the (only representative of the) Improved Harushio Class. The *Asashio* is fitted with a non-penetrating type periscope that has a remote viewing screen in the control room. It also has new, more highly automated engineering control systems and anechoic hull coating. The hull is 3 feet (1 meter) longer and about 90 tons heavier than that of the other Harushio class boats.

The fitting-out and trials time between launch and commissioning was substantially longer than that of its predecessors, presumably because of the differences in the systems.

**Oyashio Class.** The Harushio class was followed by a considerably larger design, with a displacement of about 3,000 tons submerged and a hull length of 268 feet (82 m). The original plans called for inclusion of an air-independent propulsion system based on the Stirling Cycle engines. Four ships have been approved for procurement. More of the same type may be procured later, or, more likely, another new design will eventually succeed that class in due time, since Japan is slowing down the pace of its submarine construction from the peak years of one every 12 months, and is cutting back the total number of its submarines.

A separate, new report has been issued for this class.

## Program Review

**Background.** The JMSDF began design studies on an improved Uzushio submarine in 1972 to replace submarines built during the late 1950s and nearing the end of their service lives. The requirement was for a submarine with greater range, deeper diving capability and improved electronics. The studies were completed by 1974, and in fiscal year 1975, the Diet (Japan's Parliament) authorized the first new submarines of the Yuushio class. That same year, the Japanese Defense Council authorized a force level of 16 submarines.

In late 1984, the JMSDF's design staff began considering the systems that would be required in an Improved Yuushio class. Detailed design of this class began in early 1985, and by early 1986, most of the design work was completed. The Diet approved the request for the first Improved Yuushio, now called the Harushio, class submarine (SSK 583) in March 1986, and it was ordered in May 1986. The keel for this submarine was laid in Mitsubishi's Kobe shipyard in April 1987, at which time an order was placed for the second submarine of the class.

The keel for the second submarine of the class was laid April 8, 1988. This was followed by further keels being laid in 1989 and 1990. The first submarine of the new class was launched in July 1989 and entered service in December of the following year. A construction rate of one submarine per year had been maintained since that time. Orders are placed alternately with Mitsubishi and Kawasaki Shipbuilding. Each yard is responsible for the detailed design of the boats built in its facilities, thus establishing two independent production streams.

In 1993, the Japanese Ministry of Defense purchased a single Stirling Cycle diesel engine for study by Mitsubishi Heavy Industries. MHI has also signed an agreement with Kockums to develop a 600 kW version of this engine. These steps are believed to be preliminary to MHI producing Stirling Cycle engines under license for the new group of Harushio submarines. A second experimental Stirling Cycle engine was ordered in early 1995.

Japan's interest in air-independent propulsion systems continued through 1996 with a second Stirling Cycle engine being delivered for trials. Far-term Japanese plans suggested that a new class of submarine, displacing 3,000 tons and powered by four of these engines, be designed. Since then, however, those plans were abandoned, and the succeeding Oyashio class now features traditional diesel-electric propulsion.

Japan's submarine fleet is very modern. The JMSDF has introduced three successive classes of modern

Albacore-hulled diesel-electric submarines into service with the result that their expertise in designing this class of vessel is unsurpassed. The practice of insisting that both Mitsubishi and Kawasaki undertake their own detailed design for submarines built in their yards has provided a solid industrial basis and means the output of submarines can be doubled at any time simply by ordering boats from both yards every year rather than alternating between them.

Although treaty limitations require the front-line strength to be kept at 16 boats, the JMSDF submarine fleet is larger than it appears at first glance. This is achieved by assigning the surplus hulls, which are 16 years old and still of very modern design, to training duties. On the other hand, 1997 reports concerning the Japanese Navy's long-term plans suggest that the country is planning to reduce its submarine force to 12-14 diesel-electric units at any time. This means that the replacement rate of the decommissioned submarines will not be as rapid as it had been. The reduction in the number of submarines in active service is also dictated by the financial realities of today, resulting from the economic slowdown that hampered the entire region from late 1997 to early 1999. Japan is one of the last countries to recover from that crash, and is characterized as still being in the process of struggling to reform its traditional hierarchy structures and business culture, especially in the financial sector.

## Funding

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This program is funded by Japan Maritime Self-Defense Force.

## Recent Contracts

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No contractual information has been identified.

## Timetable

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<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1984	JMSDF begins design studies for Improved Yuushio
	1986	JMSDF orders first submarine of the new class
Jan	1990	First submarine of the new class commissioned
	1992	First submarine of second group ordered
Mar	1997	Last of the series, SSK 589, commissioned

## Worldwide Distribution

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**Japan** (Seven. No submarines of this type will be exported.)

## Forecast Rationale

The Harushio class and its last copy, the *Asashio*, will continue to undergo modernization and upgrade activity as far as the onboard systems are concerned. The new Oyashio class is now coming to service on a regular pace, one a year as was the case before. The Japanese Maritime Self-Defense Force has repeatedly stated plans to cut its submarine force to 12 to 14 units, but for the moment the construction rate of the new boats seems to put those intentions further into the future. It is possible that the class following the Oyashios will, then, be produced at a slower rate than has been traditional for this nation.

The air-independent propulsion (AIP) system is unlikely to be retrofitted on any of the Harushio class ships since

it would require such a major overhaul of the hull, including cutting the pressure hull in half and inserting the propulsion package as a plug-in unit. Since the AIP technology is still at such a nascent stage in Japan, it is not likely that its application will become an issue for the Harushio class before its retirement. Retrofits could be done on the Oyashios, but even that is a long shot; as stated above, the modifications necessary for such a radical insertion of a power unit are so extensive that the cost, in most cases, would not be worth the trouble.

A new report has been issued on the succeeding Oyashio class. Please refer to it in this Tab.

## Ten-Year Outlook

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No new production of this series is projected anymore – only modernization and upgrade activity of the onboard systems will continue throughout the forecasting period; the forecast chart has therefore been omitted.

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